





Overview of Wetlands

For ESC & SWM Professionals



Module 0.

Course Overview and Introduction



Wetlands?



"This swamp is a monument to death. Snakes, alligators, quicksand, all bent on one thing: destruction."

[In: Bride of the Monster (1955, Edward D. Wood, Jr., Director) while looking out over the swamp]



Ground Rules

- Keep cell phones off during the training
- Questions and comments are encouraged
- Everyone will have an opportunity to speak and share their thoughts at the appropriate times
- Be supportive of all participants



Agenda

8:30 – 9:45	Module 1 – Introduction/Why worry about wetlands?/ Wetland functions and benefits
9:45 – 10:00	Break
10:00 – 11:00	Module 2 – How are wetland identified and classified?
11:00 – 11:45	Module 3 – Recognizing wetlands in the field
11:45 – 12:45	Lunch
12:45 – 1:45	Module 4 – Potential effects of land development on wetlands
1:45 – 2:30	Module 5 – VWP Permitting
2:30 – 2:45	Break
2:45 – 3:30	Module 6 – VWP Compliance in the Field
3:30 – 4:15	Module 7 – The CGP, VSMP, ESCP, VWP and the ESC and SW Professional
4:15 – 4:30	Module 8 – What to do when you suspect a wetland? A summary.



Course Objectives

1. Provide an overview on how wetlands function
2. Review how land development could affect wetlands
3. Understand how wetlands are classified
4. Understand how professionals identify and delineate wetlands
5. Get a basic understanding of some of the permitting issues involved with wetland impacts
6. Learn the basics of dealing with wetlands on and adjacent to a project site, including protection, avoidance and filling
7. Learn how to identify some potential problem areas in the field that might not have been identified on a plan





A few basic observations

While this is a “wetlands course”, protected are:

Waters of the U.S. and Surface Waters of the Commonwealth

This includes:

**Wetlands, Streams and
Other Surface Waters**




A few basic observations

- This is a class of ESC and SW Inspectors and Plan Reviewers!
- This is not a class for people who want to become Wetland Professional/Professional Wetland Delineator etc.

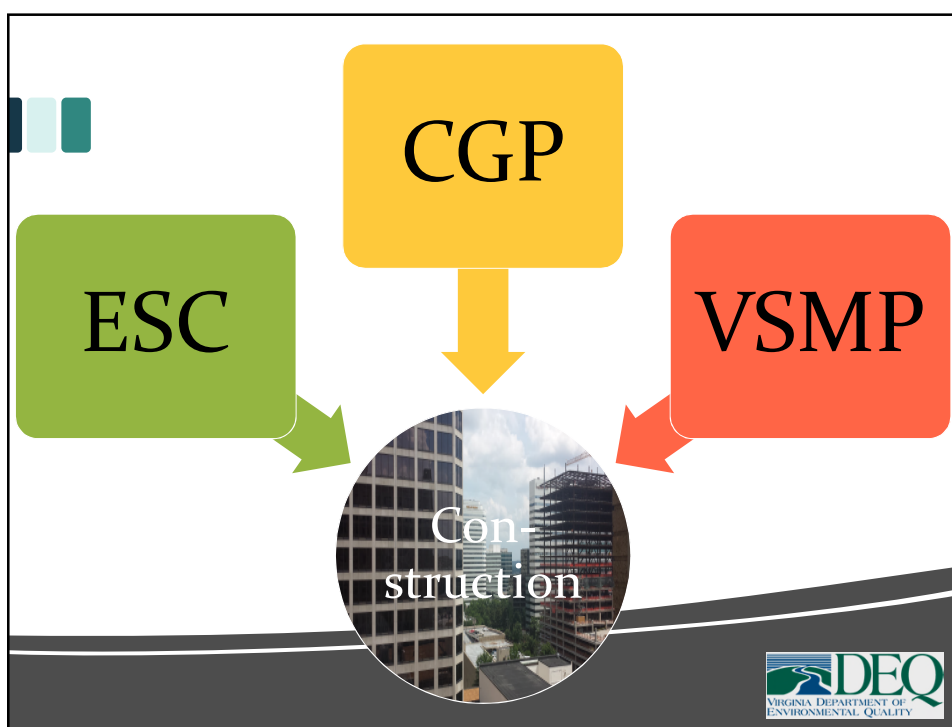

BUT:

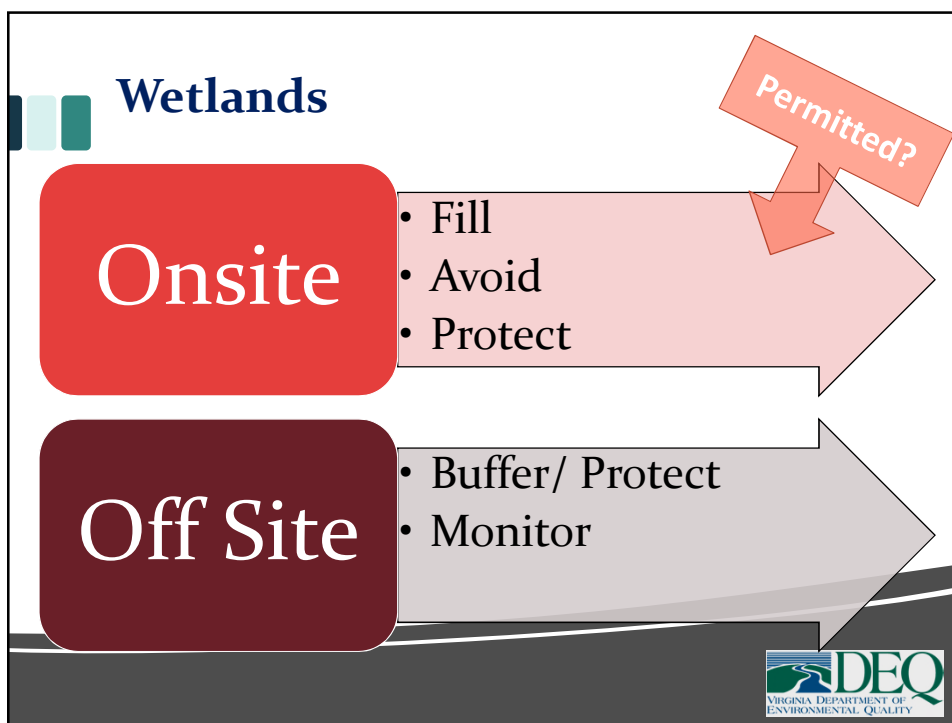




Module 1(a)

Why do ESC and SW professionals need to worry about wetlands?





Onsite Wetlands:

Come with their own ESC and SW challenges:


1. Permits, inspecting, monitoring and reporting
2. You (the ESC and SW personnel) may be the person most intimately involved with a site (in particular the smaller sites) and be able to alert your local, state or federal agents about potential unpermitted impacts on suspected wetlands located on a site where land disturbance is proposed or is taking place

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Video

The Science guy



Module 1(b)

Wetlands, an Introduction



What is a Wetland?

“Whoever undertakes to write about tracts of permanently wet but not completely submerged land that form so large a part of the earth’s surface finds himself at the outset, embarrassed by the problem of what to call them. They bear a great variety of names, corresponding only in an indefinite and ill-recognized way to actual differences among the things themselves.”

Ref: Talman, C. F. 1928. Swamps, Bogs, Marshes—or What You Will. Nature Magazine (February 1928): 109.



Name that wetland

- Wetland
- Marsh
- Bog
- (Dismal) Swamp
- Morass
- Quagmire
- Fen
- Bayou
- Muskeg

When I would recreate myself, I seek the darkest wood, the thickest and most impenetrable and to the citizen, most dismal, swamp. I enter a swamp as a sacred place, a sanctum sanctorum... I seemed to have reached a new world, so wild a place...far away from human society. What’s the need of visiting far-off mountains and bogs, if a half-hour’s walk will carry me into such wildness and novelty.” [Henry David Thoreau, *Walden and Other Writings*](#)

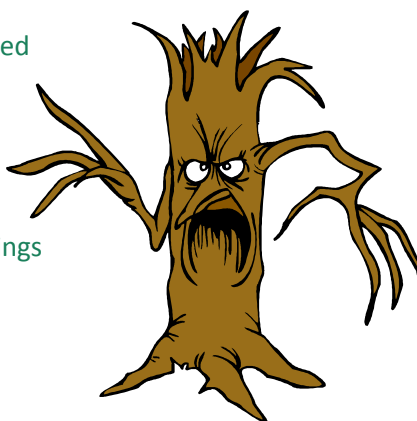
Native Americans vs. European Colonizers

Native Americans uses wetlands extensively to harvest natural resources (waterfowl, wildlife, fish, shellfish, plant materials for food and fiber). Some societies planted small agricultural plots in the midst of wetlands.



Native Americans vs. European Colonizers

Europeans avoided wetlands. They were considered disease ridden places and the haunts of evil things and peopled by members of marginalized societies.



Historically since before Roman times vanquished tribes (and displaced predators) were often forced into marginal lands such as wetlands.



Our literature often includes dark references to the vicinity of barrens or swampland (e.g. Hound of the Baskervilles, Legend of Sleepy Hollow, The Devil and Tom Walker, many fairy tales).

Prevalent negative attitudes about wetlands prevail even today...



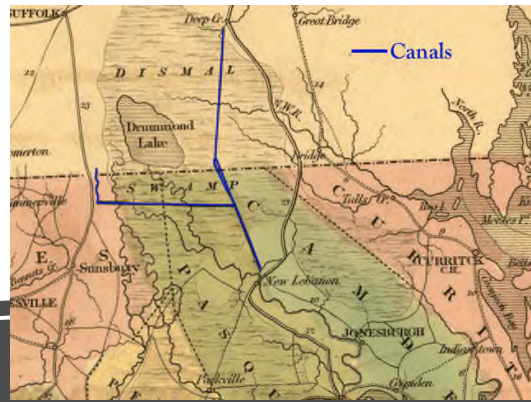
Module 1(c)

Historic overview

The Great Dismal Swamp



Surveyed in 1763 after which canal building and draining started



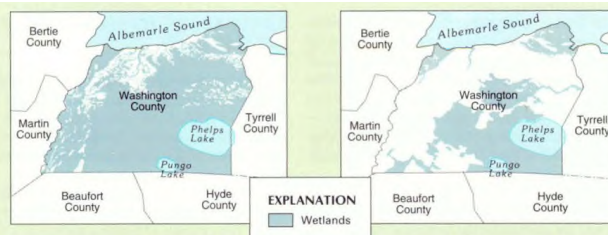
History of Wetlands



Washington County, NC

1780

1990



History of Wetlands

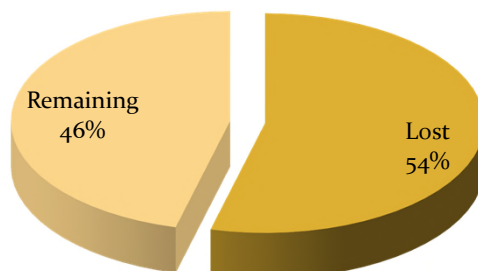


HISTORIC WETLANDS	AREA IN ACRES	DATE DRAINED
Black Swamp	3,072,000	1859–1885
Pickaway Plains	4,800	1821
Scioto Marsh	16,000	1859, 1883
Other marshes, Hardin County	9,000	1860's
Hog Creek Marsh	8,000	1868–1874
Cranberry Marsh	1,000	Unknown
Lake Erie Marshes	300,000	1936–1974
Dougan's Prairie	Unknown	1827
TOTAL	3,410,800	



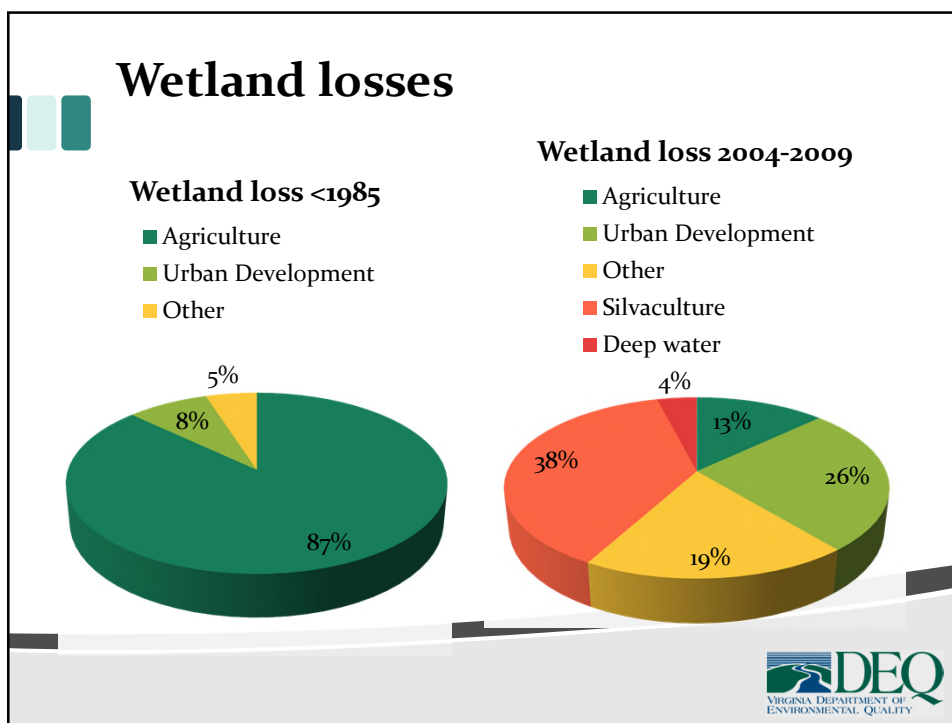
Wetlands


- Early 1600 → 221 million acres
- Mid-1980s → 103 million acres



Draining was mostly done for agriculture conversion and navigation (but also some for construction)








Module 1(d).

Wetland functions

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"This swamp is a monument to death. Snakes, alligators, quicksand, all bent on one thing: destruction."

- Cottonmouths



- Ticks

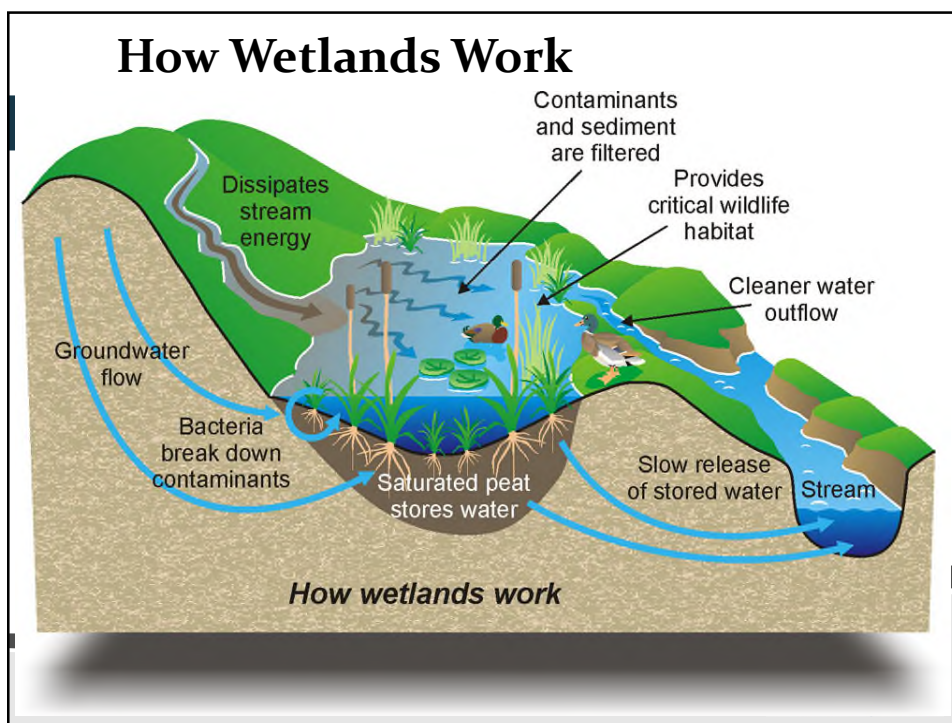


- Mosquitoes



"This swamp is a monument to death. Snakes, alligators, quicksand, all bent on one thing: destruction."





Wetland Functions

- The normal or characteristic activities that take place in wetland ecosystems, or simply.....

The things that wetlands do.

Wetland functions are the result of the physical, chemical and biological attributes and processes of wetlands.

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Wetland Functions

- Clean water (kidneys of the environment)
- Groundwater recharge/storage
- Clean air
- Attenuates floods
- Attenuate waves/storms
- Biodiversity
- Recreation
- Navigation



Wetland Functions

- Clean water (kidneys of the environment)

Thousands have lived without love, no one without water – W.H. Auden (poet)

Filthy water cannot be washed



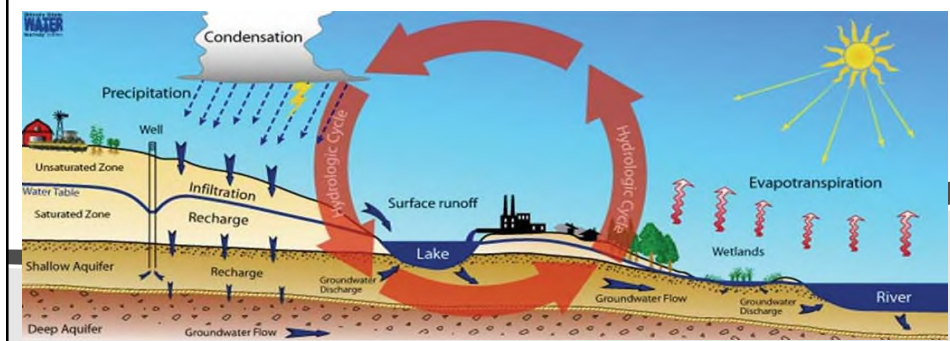
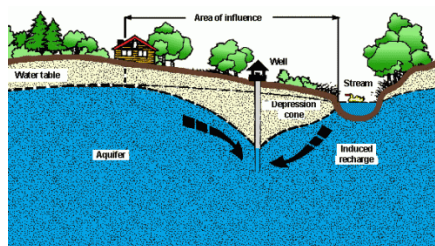
Wetlands are the kidneys of the environment

- Sediment capture
- Nutrient uptake and fixation
- Pollutant trapping and/or breakdown
- Groundwater recharge

- Clean runoff
- Clean infiltrating water



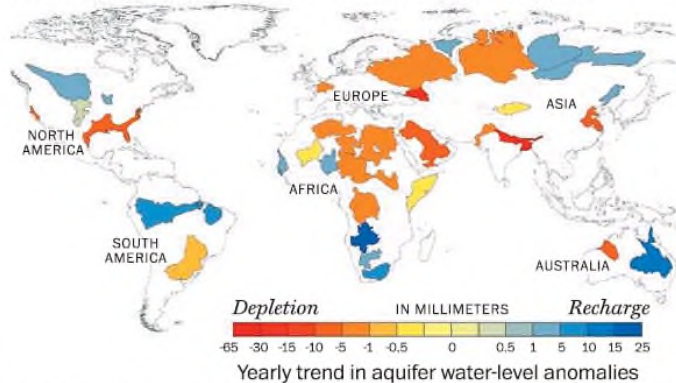
Groundwater Recharge



Groundwater Recharge

Satellite system flags stressed aquifers

More than half of Earth's 37 largest aquifers are being depleted, according to gravitational data from the GRACE satellite system.



SOURCE: Water Resources Research

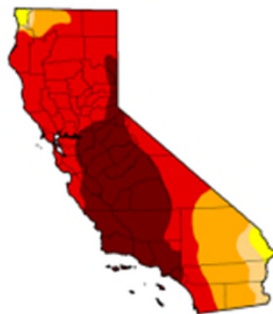
PATTERSON CLARK / THE WASHINGTON POST

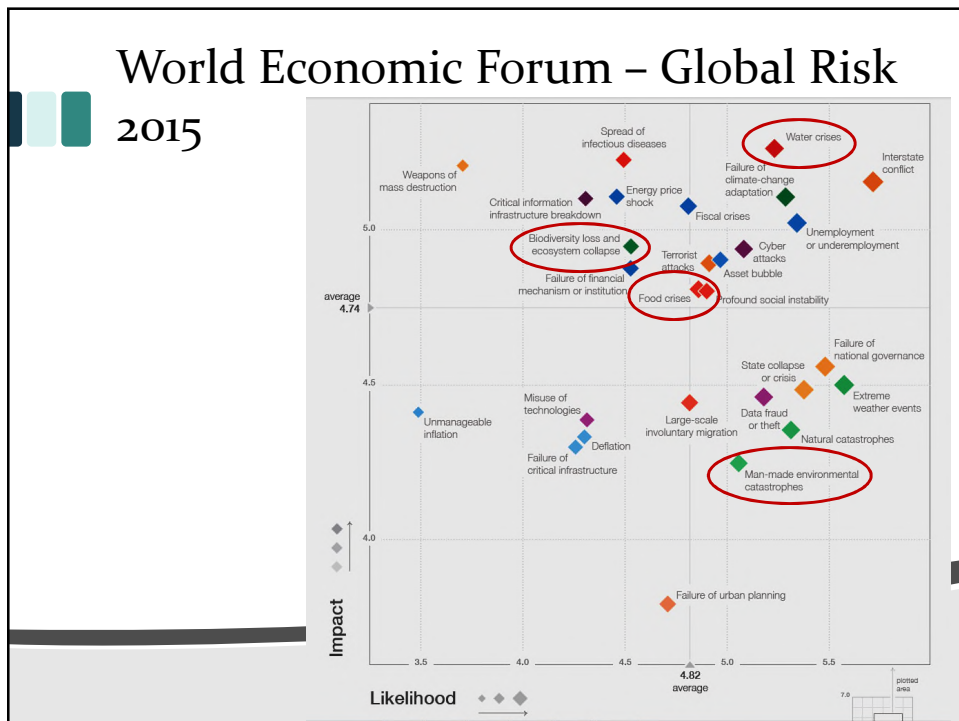
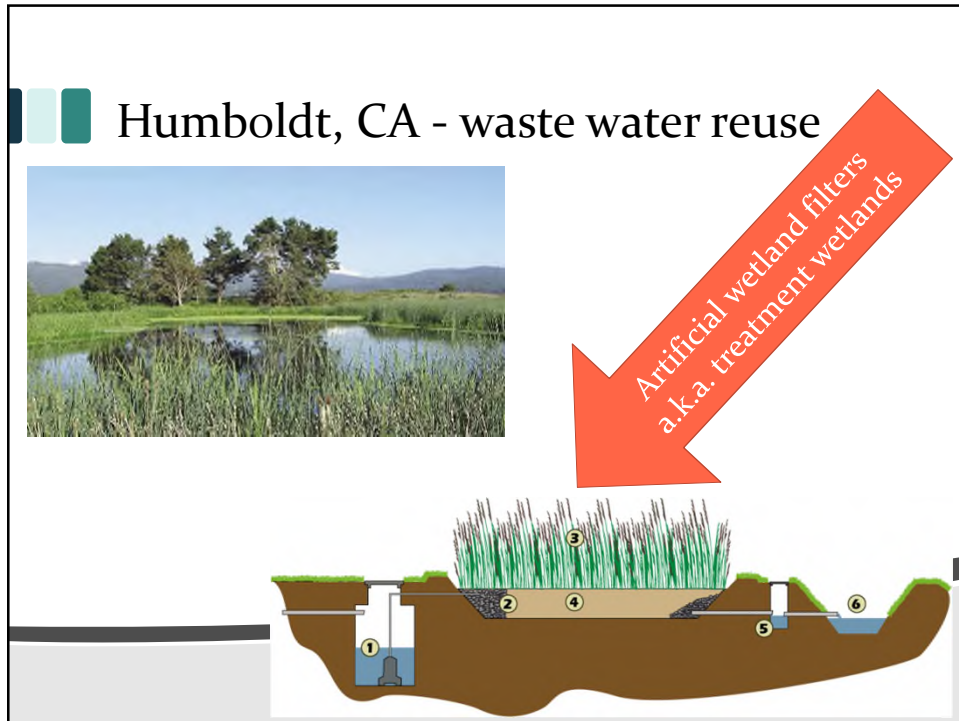
- Pumping
- Deforestation
- Urbanization

Washington Post -
6/17/2015



U.S. Drought Monitor California





Economic Benefit too....



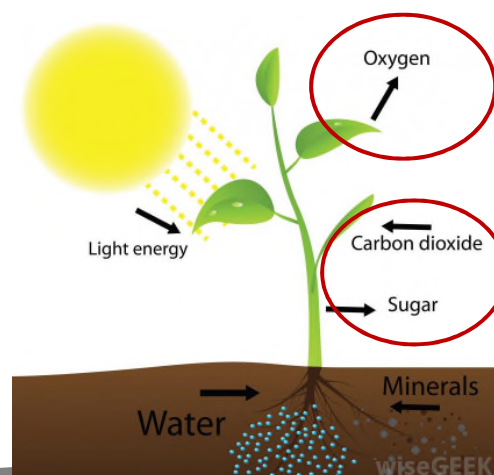
Wetland Functions

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Net Primary Production

The amount of carbon dioxide (CO₂) taken out of the air and turned into biomass (first sugar and then additional plant parts)

→ grams/meter².year



Net Primary Production of Terrestrial Ecosystems

Ecosystem Type	Area (10 ⁶ km ²)	Mean NPP (g/m ² /yr)	World Biomass (10 ⁹ tons)
Tropical Rain Forest	17.0	2,200	763
Tropical Seasonal Forest	7.5	1,600	260
Temperate Evergreen Forest	5.0	1,300	175
Temperate Deciduous Forest	7.0	1,200	210
Boreal Forest	12.0	800	240
Woodlands & Shrublands	8.5	700	50
Savanna	15.0	900	60
Temperate Grasslands	9.0	600	14
Tundra & Alpine	8.0	140	5
Desert & Semi-Desert	18.0	90	13
Extreme Desert & Ice	24.0	3	0.5
Cultivated Land	14.0	650	14
Swamp & Wetland	2.0	2,000	30
Lake & Stream	2.0	250	0.05

Net Primary Production of Terrestrial Ecosystems

Dead biomass in wetlands → Peat



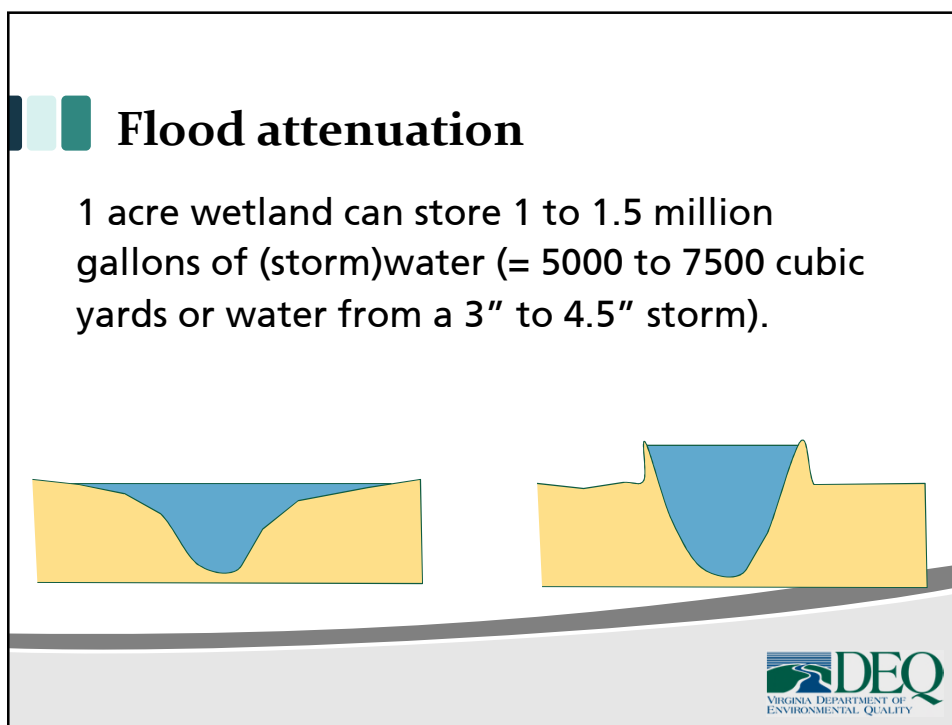
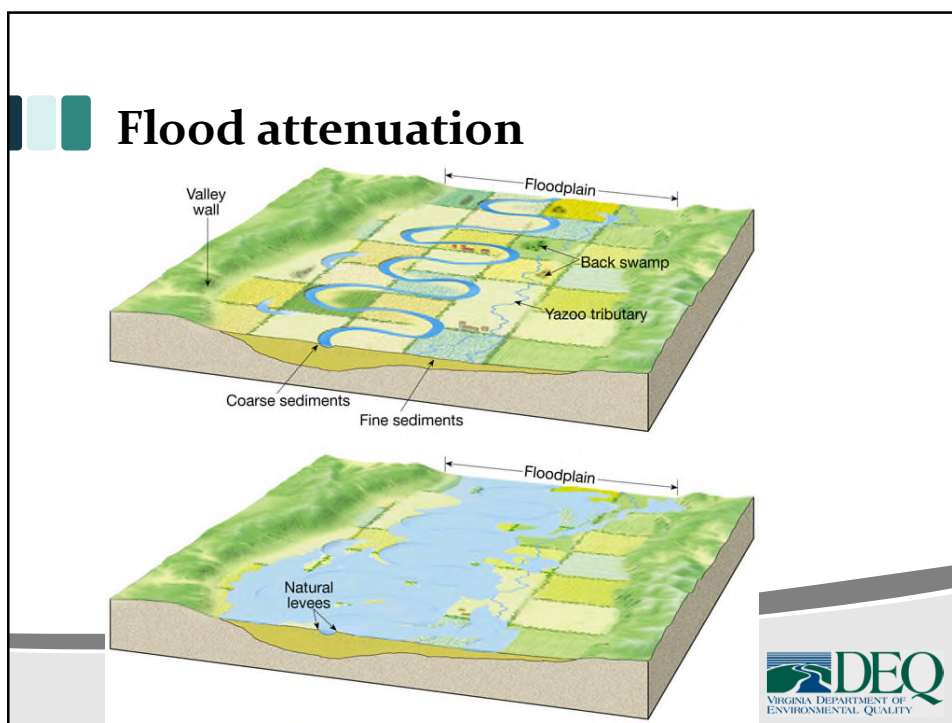
Wetland Functions

- Clean water (kidneys of the environment)
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"That's standard with new homes built on flood plains."





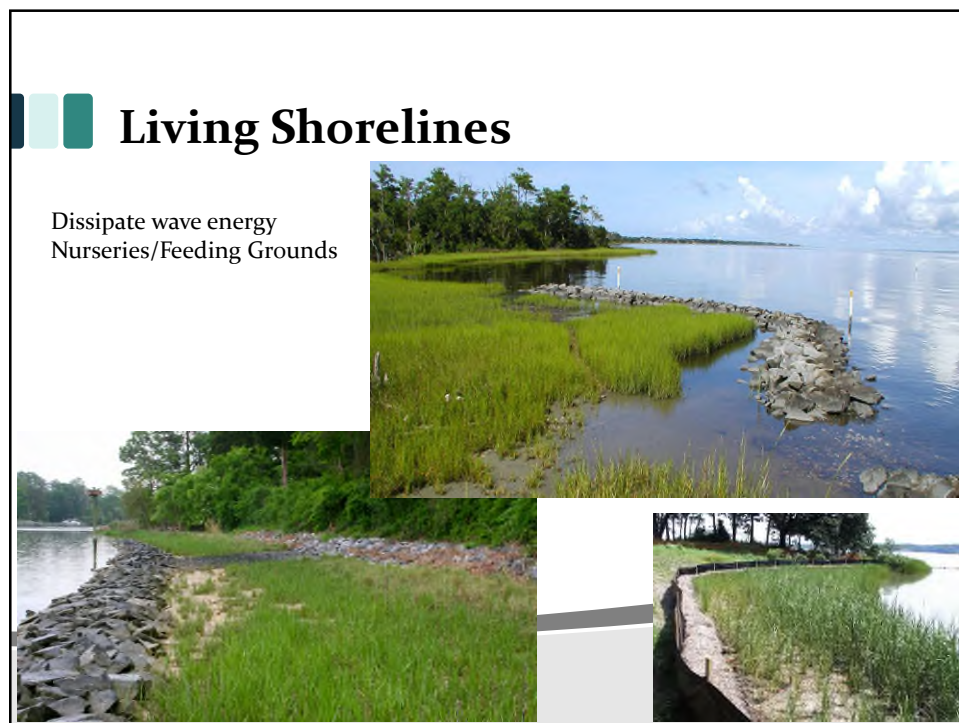
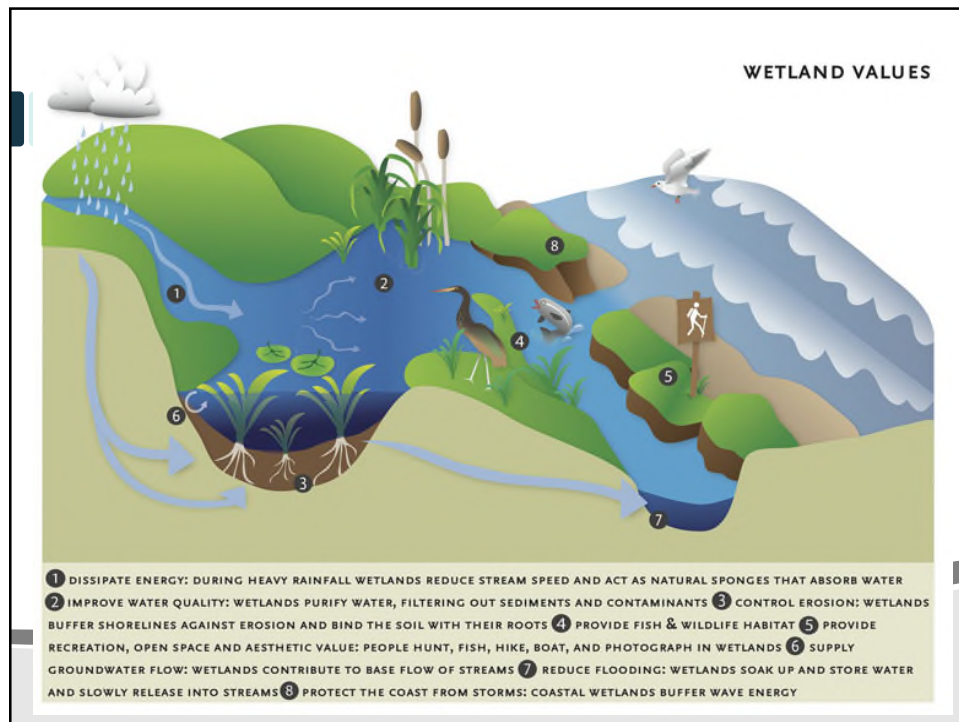
2011 Flooding of the Mississippi

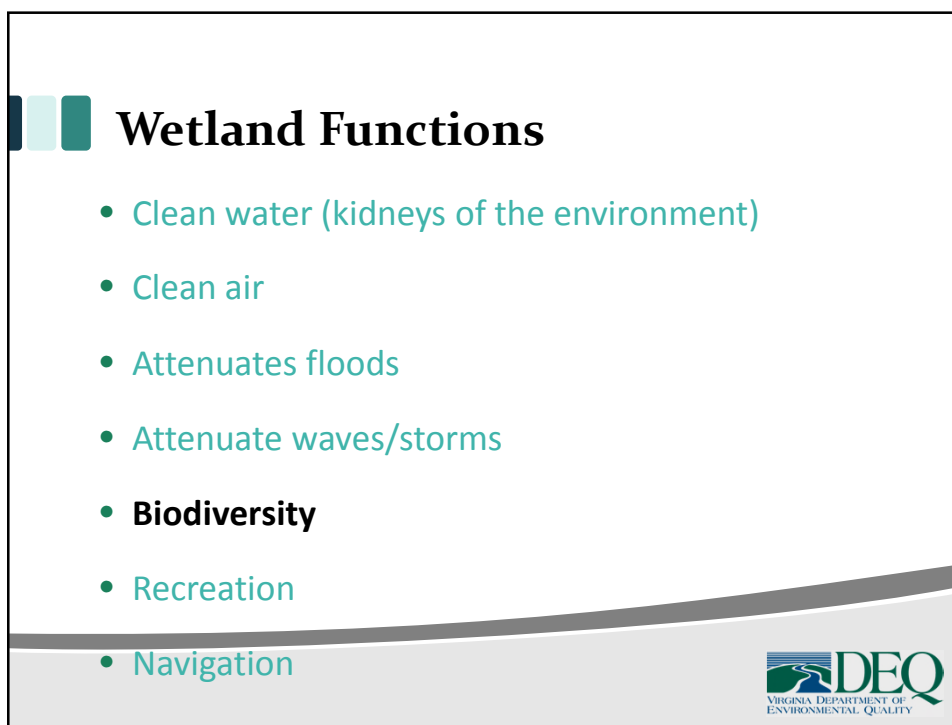
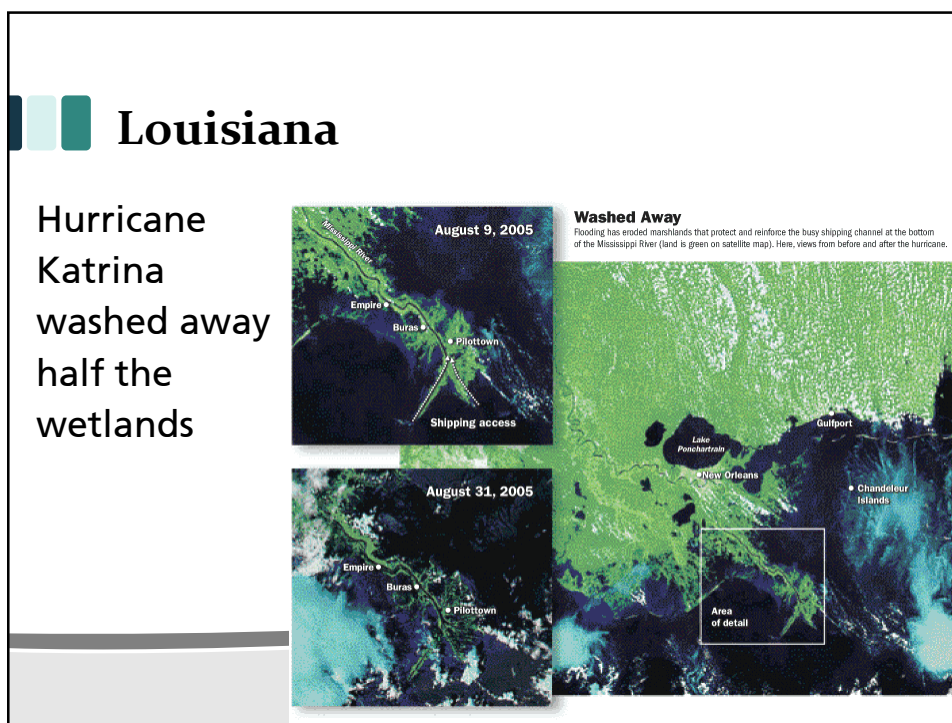


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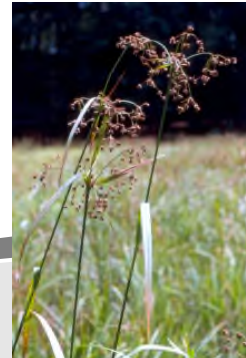
Examples of how Wetlands Support Biodiversity

Illinois:

- 105 bird species depend on wetlands
- 169 additional bird species use wetlands at various times
- 46 of the 59 mammal species use wetlands
- 37 of the 41 amphibian species use wetlands
- 47 of the 60 reptile species use wetlands



Wetlands in Virginia provide rare habitat for a variety of different T&E species.



..... Just to name a few

Threatened and Endangered Species

Wetlands in Virginia provide rare habitat for a variety of different T&E species.

- Eastern tiger salamander (*Ambystoma tigrinum*)
 - Breeds in upland ephemeral wetlands and stays relatively close throughout their lifespan



- Wood turtle (*Glyptemys insculpta*)
 - Woods, wetlands, and fields in normal weather conditions but moves to water during dry periods



Threatened and Endangered Species

Wetlands in Virginia provide rare habitat for a variety of different T&E species.

- Barking treefrog (*Hyla gratiosa*)
 - Shallow ponds and low wet woods and swamps



- Swamp-pink (*Helonias bullata*)
 - Saturated but not flooded wetlands



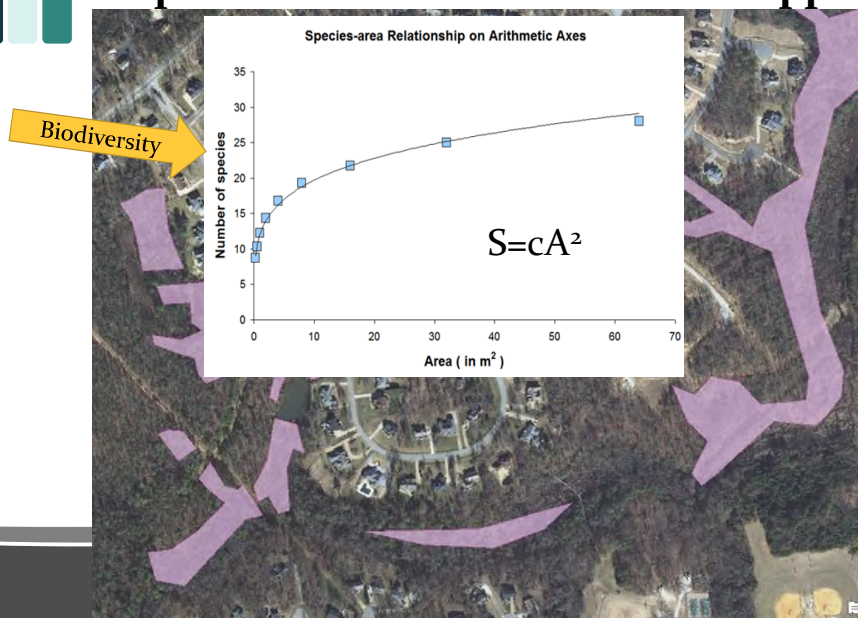
- Northeastern bulrush (*Scirpus ancistrochaetus*)
 - Small wetlands, sinkhole ponds and wet depression wetlands with seasonally fluctuating water levels



The Larger the Wetland, the More Species Depend on it or the More it can Support!



The Larger the Wetland, the More Species Depend on it or the More it can Support!



Wetland Functions

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Recreation



Recreation

Conserved and restored
more than 13 million
acres



A screenshot of the Ducks Unlimited website. The header features the Ducks Unlimited logo and navigation links: "JOIN DU", "HOW TO HELP", "CONSERVATION", and "HUNTING". Below the header, there are links for "Where We Work", "How We Conserve", "Public Policy", and "Waterfowl Biology". The main content area is titled "Wetlands & Grassland Habitat" with the subtitle "The benefits of two key waterfowl habitat types". It includes a paragraph about the organization's conservation efforts since 1937, a list of "Wetland Benefits" (Waterfowl Habitat, Recreation, Flood Storage, Groundwater Recharge, Water Quality, Fish Habitat, Biodiversity), and a small image of a duck in a wetland.

Wetland Functions

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Transport over water in Virginia (2013)

- 50 million tons of coal
- 2 million tons of oil products
- $\frac{3}{4}$ million tons of fertilizers
- 1.2 million tons of chemicals
- 2 million tons of wood and wood products
- 6 million tons of food products
- 2 million tons of manufactured goods
- 3+ million tons unclassified goods

US Army Corps of Engineers, Waterborne Commerce Statistics Center

The National Wetland Condition Assessment 2011

48% Good condition

28% Fair condition

32% Poor condition



